



## Standard 1

## Number Sense and Computation

**CORE STANDARD**

## Number Sense and Computation

**Counting to 20**

Count objects and use objects, pictures and numerals to represent whole numbers up to 20. Find the number that is one more than or one less than any whole number up to 20. Recognize numbers from 10 to 20 and represent them as groups of tens and ones using objects, diagrams and numerals.

[Standard Indicators: K.1.1, K.1.2, K.1.4]

- K.1.1** Count objects in a set and use objects, pictures and numerals to represent whole numbers to 20.
- Example:** Children match the oral counting numbers with each item in a set and give the last number counted as the quantity of the set. Students recognize five objects, five pictures, the word *five* and the numeral 5 as equivalent.
- K.1.2** Find the number that is one more than or one less than any whole number up to 20.
- Example:** Play “One Less” Dominoes by placing a domino that represents one less than the last piece played and saying, “Five is one less than six,” as they place their piece. Play “One More” Dominoes also.
- K.1.3** Use correctly the words *one* and *many*; *none*, *some* and *all*; *more* and *less*; *most* and *least*; and *equal to*, *more than* and *less than*.
- Example:** Take some of the blocks out of the box, but not all of the blocks.
- K.1.4** Show equivalent forms of whole numbers from 10 to 20 as groups of tens and ones using objects, diagrams and numerals.
- Example:** Using a two-column mat, put 10 counters on the left side and five counters on the right side. Identify the number of counters by saying 10 and five is 15. Vary the number of ones and repeat.
- K.1.5** Model addition for numbers less than 10 by joining sets of objects and model subtraction by removing objects from sets.
- Examples:**
- Join a group of three cubes to a group of four cubes to make a group of seven cubes while saying, “ $7 = 4 + 3$ .”
  - From a pile of eight crayons, remove six crayons and tell how many crayons are left while saying, “ $8 - 6 = 2$ .”
- K.1.6** Record and organize information and answer questions about data using objects and pictures in context.
- Example:** Ask everyone in your class which color is his or her favorite. Color one box on grid paper for each child’s response.



## Standard 2

## Algebra and Functions

K.2.1 Verbally describe mathematical relationships involving addition and subtraction situations for numbers less than 10.

**Example:** Using objects, verbally describe in an equation the joining of a group of three objects with one more object (e.g.,  $3 + 1 = 4$ ).

K.2.2 Create, extend and give the rule for simple patterns with numbers and shapes.

**Example:** Make a pattern with one square, one circle, one square, one circle, etc. Give a rule for the pattern and tell which shape comes next. Justify your choice.

## Standard 3

## Geometry and Measurement

### CORE STANDARD

#### Geometry and Measurement

##### Comparing and Classifying Objects

Identify, describe, sort, compare and classify objects by shape, size, number of vertices and other attributes.

[Standard Indicator: K.3.1]

##### Comparing Measures

Make direct comparisons of the length and weight of objects and recognize which object is shorter, longer, taller, lighter or heavier.

[Standard Indicator: K.3.3]

K.3.1 Identify, describe, sort, compare and classify objects by shape, size, number of vertices and other attributes.

**Example:** Sort the tagboard shapes in the box into those that have straight sides and those that do not. Make up your own rule for sorting and sort the shapes in a different way.

K.3.2 Identify the positions of objects in space and use the terms *inside*, *outside*, *between*, *above*, *below*, *near*, *far*, *under*, *over*, *up*, *down*, *behind*, *in front of*, *next to*, *to the left of* and *to the right of*.

**Example:** Play “Simon Says” with words and motions to put the block inside, outside, above and below the box.

K.3.3 Make direct comparisons of the length and weight of objects and recognize which object is shorter, longer, taller, lighter or heavier.

**Example:** Line up pencils side by side, from shortest to longest, and explain the ordering used.



**K.3.4** Identify concepts of time (*before, after, shorter, longer, morning, afternoon, evening, today, yesterday, tomorrow, week, month and year*).

**Example:** Tell about something you did yesterday and something you plan to do tomorrow while the teacher records the responses on a chart labeled *yesterday* and *tomorrow*.

## PROCESS STANDARDS

Indiana's Academic Standards for Mathematics describe the key content of each grade level and course, and students must develop conceptual understanding of this content. The American Diploma Project noted that, "beyond acquiring procedural mathematical skills with their clear methods and boundaries, students need to master the more subjective skills of reading, interpreting, representing and 'mathematizing' a problem" (p. 55).

The National Council of Teachers of Mathematics has described five Process Standards that "highlight ways of acquiring and using content knowledge" (p. 29). The following Process Standards must be addressed throughout the learning and teaching of Indiana's Academic Standards for Mathematics in all grade levels in mathematics.

### Problem Solving

- Build new mathematical knowledge through problem solving.
- Solve problems that arise in mathematics and in other contexts.
- Apply and adapt a variety of appropriate strategies to solve problems.
- Monitor and reflect on the process of mathematical problem solving.

### Reasoning and Proof

- Recognize reasoning and proof as fundamental aspects of mathematics.
- Make and investigate mathematical conjectures.
- Develop and evaluate mathematical arguments and proofs.
- Select and use various types of reasoning and methods of proof.

### Communication

- Organize and consolidate mathematical thinking through communication.
- Communicate mathematical thinking coherently and clearly to peers, teachers and others.
- Analyze and evaluate the mathematical thinking and strategies of others.
- Use the language of mathematics to express mathematical ideas precisely.

### Connections

- Recognize and use connections among mathematical ideas.
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- Recognize and apply mathematics in contexts outside of mathematics.



## Representation

- Create and use representations to organize, record and communicate mathematical ideas.
- Select, apply and translate among mathematical representations to solve problems.
- Use representations to model and interpret physical, social and mathematical phenomena.

In addition, estimation, mental computation and technology are areas that need to be addressed at all grade levels in mathematics.

## Estimation and Mental Computation

- Know and apply appropriate methods for estimating the results of computations.
- Round numbers to a specified place value.
- Use estimation to decide whether answers are reasonable.
- Decide when estimation is an appropriate strategy for solving a problem.
- Determine appropriate accuracy and precision of measurements in problem situations.
- Use properties of numbers and operations to perform mental computation.
- Recognize when the numbers involved in a computation allow for a mental computation strategy.

## Technology

- Technology should be used as a tool in mathematics education to support and extend the mathematics curriculum.
- Technology can contribute to concept development, simulation, representation, communication and problem solving.
- The challenge is to ensure that technology supports, but is not a substitute for, the development of skills with basic operations, quantitative reasoning and problem-solving skills.
  - Elementary students should learn how to perform thoroughly the basic arithmetic operations independent of the use of a calculator.
  - The focus must be on learning mathematics and using technology as a tool rather than as an end unto itself.

## References

American Diploma Project (2004). *Ready or Not: Creating a High School Diploma that Counts*. Washington, D.C.: Achieve, Inc.

National Council of Teachers of Mathematics (2000). *Principles and Standards for School Mathematics*. Reston VA: author.